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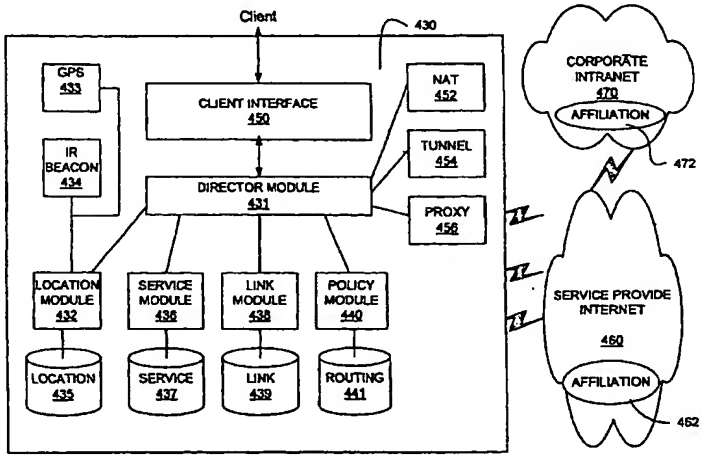

(57) Abstract: The invention includes an apparatus and a method of connecting a computing device to a computer network through at least one of a plurality of computer network connections. The method includes determining which of a plurality of network service providers are available to the computing device. At least of the available network service providers is selected based upon information of the computing device. Access is provided to the selected network service provider. Determining what network service providers are available to the computing device can include determining a location of the computing device, and determining what network service providers are available to the computing device based upon the location of the computing device. The invention can further include monitioring a plurality of computer network connections, and selecting at least one optimal computer network connection. A network interconnection is provided between the computing device and the computernetwork through the at least one optimal computer network connection.

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A SYSTEM AND METHOD FOR PROVIDING PERSONAL CONNECTIVITY BETWEEN A COMPUTING DEVICE AND A COMPUTER NETWORK

Field of the Invention

The invention relates generally to providing personal connectivity between a computing device and a computer network. More particularly, the invention relates to a method and system for providing a computing device with a continually optimized link to the computer network, and continually optimized access to a service provider.

Background of the Invention

Wired and wireless connectivity of computing devices to a computer network is growing at a rapid rate. Connectivity includes wired connection of personal computers to the internet, as well as wireless connection of portable electronic devices such as portable computers, personal digital assistants, hand-held computers and mobile telephones, to the internet.

Presently, connectivity between a computing device and the internet is limited to one of many possible different types of wired and wireless network connections at a time. Each connectivity or link type generally requires a particular associated service provider. For example, a phone connection to the internet generally is associated with a particular service provider, whereas a wireless cellular connection to the internet is generally associated with a different service provider. Correspondingly, a blue tooth LAN connection and an 802.11 LAN connection are generally associated with a different service provider.

Figure 1 shows a prior art wired link 130 between a computing device 110 and a network 150. Figure 2 shows a prior art wireless link between the computing device 110 and

the network 150. The wireless link generally includes a transmitter antenna 160 associated with the computing device 110, and a receiver antenna 170 associated with a receiving device 180 and the network 150.

If a user of a computing device wishes to transition from one type of link to the internet to another type of link, the computing device must generally physically change the link. Additionally, a link transition generally requires a service provider transition.

A business person traveling across the country cannot maintain continuous connectivity of a computing device to the internet. That is, a computing device associated with the business person must transition from one link type to another as the availability of links varies depending upon the physical location of the business person. A home office may include a wired link to the internet, whereas a wireless link may be required during travel. An office link may include a wireless LAN link or a wired link. The transition from one link type to another can include physically changing linking hardware associated with the computing device. Additionally, the computing device must access different service providers as the link types change.

Figure 3 is a flow chart showing the basic steps included within the prior art for accessing a service provider for a computing device. A first step 310 includes connecting the computing device to the internet through a network interface. A second step 320 includes a user of the computing device manually inputting a location of the computing device. The computing device location may be preset, and therefore, not entered by the user. A third step 330 includes manually selecting a service provider from a subscription list. Generally, the computing device has a predetermined service provider that corresponds to the link type. A

fourth step 340 includes accessing the service provider and providing credentials such as a logon and password.

It is desirable to have an apparatus and method that provides connection management between a computing device and computer networks. That is, it is desirable that a computing device be able to pass from one link or connection type to another, so that the transition from one link type to another is transparent to a user of the computing device. The continuous connection management should include selection of an optimal link to the computer network, and provide access to an optimal service provider.

Summary of the Invention

The invention includes an apparatus and a method for providing maintenance of a connection of a computing device to a computer network that is transparent to a user of the computing device. The maintenance includes automated transitions from one network link type to another network link type, and automated transitions from one service provider to another service provider.

A first embodiment of the invention includes a method of connecting a computing device to a computer network through at least one of a plurality of computer network connections. The method includes determining which of a plurality of network service providers are available to the computing device. At least one of the available network service providers can be selected based upon information of the computing device. Access is provided to the selected network service provider. Determining what network service providers are available to the computing device can include determining a location of the computing device, and determining what network service providers are available to the computing device based upon the location of the computing device. Determining a location of the computing device can include estimating the location of the computing device with a global positioning system (GPS) located within the connectivity device, or estimating the location through information received from a reference beacon signal.

A second embodiment is similar to the first embodiment. The second embodiment further includes monitoring a plurality of computer network connections, and selecting at least one optimal computer network connection. A network interconnection is provided between the computing device and the computer network through the at least one optimal

computer network connection. Monitoring of the plurality of computer network connections can include receiving a reference beacon signal that comprises information regarding a location and types of computer networks connections available. Alternatively, or in combination, monitoring of the plurality of computer network connections can include determining a location of the computing device, and determining an availability of types of computer network connections at the location of the computing device.

The selection of a computer network connection of the second embodiment, can be based upon an estimation of a cost required to maintain a network connection through each one of the plurality of computer network connections, an estimation of data bandwidths required by applications of the computing device, or an estimation of data security required by applications of the computing device. Additionally, the selection can be based upon a level of data security requested by a user of the computing device or a request of a user of the computing device.

Another embodiment is similar to the first embodiment. This embodiment includes providing a technique by which data packets provided by the computing device are presented to the computer network for routing. The technique can include a NAT personality, a proxy mode personality or a tunnel mode personality.

A third embodiment of the invention includes a method of connecting a computing device to a computer network through at least one of a plurality of computer network connections. The method includes determining a location of the computing device. A determination of what network service providers are available to the computing device is made based upon the location of the computing device. An available network service

provider is selected based upon the location information of the computing device. Access is provided to the selected network service provider. Several computer network connections are monitored. At least one of the monitored computer network connections is selected based upon the location of the computing device. A network interconnection is provided between the computing device and the computer network through the selected computer network connection.

A fourth embodiment includes a connectivity device for providing a connection between a computing device and a computer network through at least one of a plurality of computer network connections. The connectivity device includes a location module for determining a location of the connectivity device. A link module for provides a link between the computing device and the computer network based upon the location and information received from the computing device. A service module provides access to a service provider based upon the link and information received from the computing device. This embodiment can further include a policy module for managing links maintained by the link module.

A fifth embodiment includes an article of manufacture adapted to provide a connection between a computing device and a computer network, through at least one of a plurality of computer network connections. The article of manufacture is adapted for use with a machine. The machine includes a machine readable media, and instructions stored on the machine readable media that when executed control the machine to determine which of a plurality of network service providers are available to the computing device, select one of the available network service providers based upon information of the computing device, and provide access to the selected network service provider. Another embodiment additionally includes instructions stored on the machine readable media that when executed further

control the machine to determine a location of the computing device, and determine what network service providers are available to the computing device based upon the location of the computing device. Another embodiment additionally includes instructions stored on the machine readable media that when executed further control the machine to monitor a plurality of computer network connections, select at least one optimal computer network connection, and provide a network interconnection between the computing device and the computer network through the selected computer network connection.

Other aspects and advantages of the present invention will become apparent from the following detailed description, taken in conjunction with the accompanying drawings, illustrating by way of example the principles of the invention.

Brief Description of the Drawings

Figure 1 shows a prior art wired connection between a computing device and a network.

Figure 2 shows a prior art wireless connection between a computing device and a network.

Figure 3 is a flow chart showing how the prior art matches a service provider with a computing device user.

Figure 4 shows a block diagram of an embodiment of the invention.

Figure 5 shows a block diagram of a client (a computing device user).

Figure 6 shows a block diagram of a link module according to an embodiment of the invention.

Figure 7 is a flow chart showing acts included within an embodiment of the invention.

Figure 8 is a flow chart showing acts included within another embodiment of the invention.

Detailed Description

As shown in the drawings for purposes of illustration, the invention is embodied in an apparatus and a method for providing computing device with a continual link to a computer network, and continual access to a network service provider. The invention allows the computing device to transition from one computer network link to another computer network link, and to transition from one service provider to another. The computer network link transitions and service provider transitions are transparent to a user of the computing device.

Several embodiments of the connectivity device will be described. It should be understood that depending upon the features of particular configurations of the invention, the connectivity device can be implemented with software, or a combination of software and hardware. Computing devices that can be connected to the connectivity device include but are not limited to personal computers, laptop computers, hand held devices and cell phones.

Embodiments of the invention provide constant monitoring of the availability of computer network connection links available to an associated computing device. An optimal link can be selected based upon user connectivity rules and client (computing device user) preferences and habits. Embodiments of the invention also include providing the computing device with access to service providers. The invention allows the computing device to be continually connected to the computer network.

Figure 4 shows a block diagram of an embodiment of the invention. Figure 4 includes an embodiment of the connectivity device 430, and networks 460, 470 that can be accessed by a client (a user of the computing device). It is to be understood that the embodiment shown in Figure 4 is merely an example of how the invention can be configured. The embodiment of Figure 4 includes many elements. Alternate embodiments of the invention can include subsets of the depicted elements.

An embodiment of the connectivity device 430 includes a client interface 450. The client interface is a standard interface used for transferring data between the client and the connectivity device 430. Generally, the client and the connectivity device 430 remain connected over large periods of time. However, clients and connectivity devices are easily interchanged, and the connectivity device can be extended to interface with more than one client.

An embodiment of the connectivity device 430 includes a director module 431. The director module 431 generally includes the intelligence of the connectivity device 430. That is, the connectivity device 430 includes numerous modules (as will be described) that each include some functionality of the connectivity device 430. The director module 431 provides controls over the modules. An example of the functionality of the director module 431 will described later.

An embodiment of the invention includes a location module 432. The location module 432 generally determines where the client is physically located. The invention includes several different methods of determining the location of the client. The location of the client can be determined by information received from the client, by a global positioning

system (GPS) receiver, by a reference beacon, or by determining the present area code of the client.

As will be described, the client generally includes client location information. This information can include recent connections, client specified computing device locations, or regional information. From this information, the location module 432 of the connectivity device 430 can determine the location of the client.

An embodiment of the connectivity device 430 includes a GPS receiver module 433. The GPS module 433 can receive GPS signals for the purpose of determining the longitude and latitude of the connectivity device 430. If the connectivity device 430 is proximate to the client, then by default, the location of the client can be determined. GPS receivers are well known in the art of electronics.

An embodiment of the connectivity device 430 includes an infrared (IR) beacon receiver module 434. The beacon module 434 receives information signals from beacons that are located in a vicinity of the connectivity device 430. For example, if a mobile client having an attached connectivity device 430 enters a shopping mall, the connectivity device can receive information from a beacon located within the shopping mall. Included within this the received information is the location of the shopping mall, and therefore, the location of the client and the connectivity device 430. An infrared beacon module 434 is provided as an example. The beacon module could just as easily receive radio frequencies (RF), or other wireless signals that provide a location of a transmitting beacon.

An embodiment of the location module 432 includes a connectivity device (CD) location database 435. The CD location database 435 includes information including indexing information. For example, locations can be indexed according to latitude, longitude

or street address. Additionally, network service providers can be indexed by another module according to the location of the connectivity device 430. The CD location database 435 can store updated location information received from a presently connected client, and information about a particular client that is acquired during operation.

The location module 432 generally operates by first uploading location information from the client. Next, the location module 432 determines the location of the connectivity device 430. Presently determined location information can be downloaded to the client, and used to update the CD location database 435. If the client eventually disconnects, then the local information can be deleted.

A service module 436 manages the services and service providers that the client can access. The services can be dependent upon service information provided by the client, the location of the connectivity device 430, or by association with a group affiliation.

The service information of the client can include group affiliations. For example, a client may be associated with a particular company. This association with the company provides the client with a group affiliation that suggests a particular service provider is to be accessed by the service module 436.

An embodiment of the service module 436 includes a CD service database 437. The CD service database 437 includes a service provider index. This can include an index of service providers based upon the type of link access provided by the connectivity device 430 to the network. For example, a modem link may dictate one service provider, whereas a cellular wireless link or a blue tooth wireless link may require another service provider.

Other information stored within the CD service database 437 includes service cost, bandwidth capacity, or time of day rates.

The service module 436 generally operates by first uploading client information from the client. The client information can include service provider information and group affiliations.

The service module 436 generally requests information from the client 410 such as accounts numbers and passwords. Client service information acquired during operation is generally stored in the CD service database 437.

When the client eventually disconnects, the client service information stored in the CD service database 437 is generally deleted.

An embodiment of the invention includes a link manager module 438. The link manager module 438 generally manages physical links between the client 410 and the networks 460, 470. The link manager module 438 will be described in greater detail later. The link manager module 438 generally includes several different types of links that can interface with the networks. Link types include a phone line connection, cable, wireless cellular, blue tooth, 802.11 and wired ethernet. This list is not an exhaustive list, and is provided merely for suggesting examples of possible links.

A function of the link manager module 438 is to detect what physical links are presently available to the connectivity device 430, and therefore, to the computing device. Generally, each link type is supported by a particular card that provides the required electronic functionality to support the link type. A first check by the link manager module 438 can include checking to determine which link cards are plugged into the connectivity device 430. Once a link card is detected, the link manager module 438 generally loads software drivers required for using the link. After a link card has been detected and the

proper software drivers are loaded, the link manager module 438 can check to determine that the link is active.

The link manager module 438 generally initiates an initialization process and checks authorization information received from the service module 436. If service is lost, or if a new link is detected, the link manager module 438 can alert the other modules of the connectivity device 430.

The link manager module 438 generally includes a CD link database 439. All link information acquired by the link manager module 438 can be stored within the CD link database 439.

An embodiment of the invention includes a policy module 440. The policy module 440 generally manages the links maintained by the link manager module 438. The management generally includes activating the links based upon the capabilities and cost of maintaining particular links. For example, a client may request cost limitations in maintaining a link. The policy module 440 will consider cost limitation request in determining which link to actively maintain.

Another factor used by the policy module 440 is the data bandwidth provided by each link and the data bandwidths demanded by the client. For example, some applications of the client 410 require minimal data bandwidths, whereas other application of the client can require large data bandwidths. The policy module 440 can manage the connectivity device 430 links accordingly.

The policy module 440 generally includes a CD local routing database 441 and a CD link preference database 442. The CD local routing database 441 includes information such as next hop gateway address, packet filtering or blocking rules and link management

parameters. The CD link preference database 442 includes information such as routing priorities, quality of service, and latency parameters.

As previously mentioned, the director module 431 provides the intelligence of the connectivity device 430, and coordination the activities and communications between the other module of the connectivity device 430.

Operationally, upon powering up the connectivity device 430, the director module 431 initiates the location module 432. After a location of the connectivity device 430 has been determined, the director module 431 initiates the link manager module 438 to determine what links are available to the client.

When the client connects or initiates a link to the network, the director module 431 receives the location and service information from the client, and then stores the information in the corresponding databases. Additionally, client routing requests and policies are downloaded from the client.

The director module 431 downloads location information to the client. If the connectivity device 430 cannot determine the location, then the director module 431 can prompt the client 431 for location information.

The director module 431 initiates a client link setup base on a personality of the client 410. Possible personalities of the client 431 include a tunnel personality, a NAT personality and a proxy personality. These personalities characterize the way the client accesses various services within the internet. The controls for the different personalities can be included within the connectivity device and controlled by the director module 431. The personalities are designated in Figure 4 as the tunnel personality 454, the NAT personality 452 and a proxy personality 456, and are all well known in the art of internet protocols. These personalities

are each include techniques by which data packets provided by the client 431 are presented to the network for routing.

NAT (Network Address Translation) Mode

A first mode of the connectivity device is the NAT mode. In the NAT mode, the connectivity device maintains a mapping of the client's fixed network address to the current preferred service provider assigned network address. The connectivity device modifies data packets replacing client fixed addresses with the current preferred service provider assigned network address.

In the NAT mode, the client is not aware that the client is connected to the connectivity device. Furthermore, the client perceives that the client is continuously connected to a single service provider. Servers accessed by the client perceive the client as a new client every time the connectivity device selects a new service provider.

Proxy Mode

A second mode of the connectivity device is the proxy mode. In the proxy mode, the connectivity device acts as a proxy and associates a connection to the client with a connection to a server. The connectivity device passes data from the client connection to the server connection.

In the proxy mode, the client is aware that the connectivity device may switch service providers, and that the connectivity device is acting as a proxy. However, the client perceives that the client is continuously connected to a single service provider. Servers accessed by the client perceive the client as a new client every time the connectivity device changes service providers.

Tunnel mode

A third mode of the connectivity device is the tunnel mode. In the tunnel mode, the connectivity device acts as a tunnel relay agent and tunnels data to a tunnel server agent on behalf of the client. An example of a tunnel mode is IPv4, which is a mobile IP protocol. In mobile IP, the tunnel agent is referred to as a mobile IP foreign agent and the tunnel server agent is referred to as a mobile IP home agent.

In the mobile IP mode, the client is aware that the connectivity device is acting as a foreign agent. However, the client is not aware that the connectivity device may switch service providers. The client perceives that the client is continually connected to a single service provider. Servers accessed by the client perceive the client as the same client even when the connectivity device changes service providers.

As previously stated, the tunnel personality 454, the NAT personality 452 and a proxy personality 456, and are all well known in the art of internet protocols.

Client

Figure 5 shows a block diagram of a client 510 (a computing device user). The computing device used by the client can be any sort of computing device that can be connected to a computer network including personal computers, laptop computers, hand held devices and cell phones.

The computing device of the client 510 shown in Figure 5 includes a connectivity device (CD) interface 520 and interface controller. The CD interface can be one of many commonly available computer interfaces. Generally, the client and the connectivity device remain connected over large periods of time. However, clients and connectivity

devices are easily interchanged, and the connectivity device can be extended to interface with more than one client.

The client includes a settings database 530, a credentials database 540, a location database 550 and a service database 560.

The settings database 530 generally includes the personality, priority and bandwidth requirements, and cost restraints.

The credentials database 540 generally includes account numbers and passwords of the client. Additionally, the credentials database 540 may include identification, affiliation information, or certificates or other authentication information.

The location database 550 includes client location information. This information can include recent connections, client specified computing device locations, regional information, or locations resolved from beacons or a GPS locator.

The service database 560 generally includes a list of service provider links for which the user has accounts or credentials.

Networks

A service provider network 460 includes a plurality of service provider networks. For example, the internet service provider network can include IPv4 network service via dial-up modem, 802.11 network access points, and/or cable modems. The service provider network 460 also provides network transport, routing name resolution and public routed address space.

The service provider network 460 can include an affiliation service 462. The affiliation service 472 can be provided, for example, by a value added service provider. The value added service provider can provide additional services to clients that have certain affiliations with the value added service provider. For example, affiliated clients may receive new carrier services or new service capabilities.

A corporate intranet 470 generally includes a private, or virtual private network. For example, the corporate intranet 470 can include IPv4 network services via dial-up modem, LAN infrastructure, and/or 802.11 access points. Typically, access to or from the corporate intranet 470 is limited to a set of users that are employees, contractors, or partners of a particular corporation. Corporate intranets typically control and limit access to public networks. The corporate intranet 470 also provides network transport, routing, name resolution, corporate network firewall, and a combination of private and public address space.

The corporate intranet 470 can include an affiliation service 472. The affiliation service 472 can provide additional services to clients that have certain affiliations with corporate intranet 470. For example, affiliated clients may receive new carrier services or new service capabilities.

Link Manager Module

Figure 6 shows a block diagram of a link module 610 according to an embodiment of the invention. As previously described, the link module 610 provides a physical connection between a computing device 620 and a network 630. An interface 660 exists between the computing device and the link module 610.

The link module 610 can include various types of link cards 611, 613, 615, 617, 619. Each link card 611, 613, 615, 617, 619 can support a different type of link. The links can be

wired links or wireless links as shown in Figure 6. For example, Figure 6 shows a first wired link 642 and a second wired link 644. Additionally, wireless links are provided through antennae 622, 624, and the antenna 626, receiving device 650 combination.

An embodiment of the link module 610 includes the link cards 611, 613, 615, 617, 619 being exchangeable and replaceable with new or different link cards.

A function of the link manager module 610 is to detect what physical links are presently available to the connectivity device, and therefore, to the computing device. A first check by the link manager module 610 can include checking to determine which link cards are plugged into the connectivity device. Once a link card is detected, the link manager module 610 generally loads software drivers required for using the link. After a link card has been detected and the proper software drivers are loaded, the link manager module 610 can check to determine that the link is active.

Based upon client input and the type of information being accessed by the client, the link manager module 610 provides access to the computer network through an optimal link.

Figure 7 is a flowing chart showing acts included within an embodiment of the invention. The embodiment includes a method of connecting a computing device to a computer network through at least one of a plurality of computer network connections.

A first act 710 includes connecting a computing device to a network through a connectivity device.

A second act 720 includes determining which of a plurality of network service providers are available to the computing device. Generally, this includes determining a location of the computing device, and determining what network service providers are

available to the computing device based upon the location of the computing device. The location of the computing device can be determined by information received from a client using the computing device, by a global positioning system (GPS) receiver, by a reference beacon, or by determining the present area code of the client.

A third act 730 includes selecting one of the available network service providers based upon information of the computing device.

A fourth act 740 includes providing access to the selected network service provider.

Figure 8 is a flowing chart showing acts included within another embodiment of the invention.

A first act 810 includes connecting a computing device to a network through a connectivity device.

A second act 820 includes monitoring a plurality of computer network connections. Monitoring the computer network connections can include receiving a reference beacon signal that comprises information regarding a location and types of computer networks connections available. Alternatively, or in combination, monitoring the computer network connections can include determining a location of the computing device, and determining an availability of types of computer network links at the location of the computing device.

A third act 830 includes selecting at least one optimal computer network connection. Selecting the at least one optimal computer network connection can include estimating a cost required to maintain a network connection through each of the plurality of computer network

connections, and selecting the at least one optimal computer network connection based upon the cost estimates. Selecting the at least one optimal computer network connection can include estimating data bandwidths required by applications of the computing device, and selecting the at least one optimal computer network connection based upon the data bandwidth estimates. Selecting the at least one optimal computer network connection can include estimating data security required by applications of the computing device, and selecting the at least one optimal computer network connection based upon the data security estimates. Selecting the at least one optimal computer network connection can include selecting the at least one optimal computer network connection based upon a level of data security requested by a user of the computing device. Selecting the at least one optimal computer network connection can include selecting the at least one optimal computer network connection based upon a requested of a user of the computing device.

A fourth act 840 includes providing a network interconnection between the computing device and the computer network through the at least one optimal computer network connection.

Although specific embodiments of the invention have been described and illustrated, the invention is not to be limited to the specific forms or arrangements of parts so described and illustrated. The invention is limited only by the appended claims.

Claims

What is claimed:

1. A method of connecting a computing device to a computer network through at least one of a plurality of computer network connections, the method comprising:

determining which of a plurality of network service providers are available to the computing device;

selecting one of the available network service providers based upon information of the computing device; and

providing access to the selected network service provider.

2. The method of connecting a computing device to a computer network of claim 1, further comprising:

monitoring a plurality of computer network connections;

selecting at least one optimal computer network connection; and

providing a network interconnection between the computing device and the computer network through the at least one optimal computer network connection.

3. The method of connecting a computing device to a computer network of claim 2, wherein monitoring the plurality of computer network connections comprises:

receiving a reference beacon signal that comprises information regarding a location and types of computer networks connections available.

4. The method of connecting a computing device to a computer network of claim 2, wherein monitoring the plurality of computer network connections comprises:

determining a location of the computing device; and

determining an availability of types of computer network links at the location of the computing device.

5. The method of connecting a computing device to a computer network of claim 1, wherein determining what network service providers are available to the computing device comprises:

determining a location of the computing device; and

determining what network service providers are available to the computing device based upon the location of the computing device.

6. The method of connecting a computing device to a computer network of claim 5, wherein determining the location of the computing device comprises:

estimating the location of the computing device with a global positioning system (GPS) located within the connectivity device.

7. The method of connecting a computing device to a computer network of claim 2, wherein the connectivity device selecting at least one optimal computer network connection comprises:

estimating a cost required to maintain a network connection through each of the plurality of computer network connections; and

selecting the at least one optimal computer network connection based upon the cost estimates.

8. The method of connecting a computing device to a computer network of claim 2, wherein the connectivity device selecting at least one optimal computer network connection comprises:

estimating data bandwidths required by applications of the computing device; and

selecting the at least one optimal computer network connection based upon the data bandwidth estimates.

9. The method of connecting a computing device to a computer network of claim 2, wherein the connectivity device selecting at least one optimal computer network connection comprises:

estimating data security required by applications of the computing device; and

selecting the at least one optimal computer network connection based upon the data security estimates.

10. The method of connecting a computing device to a computer network of claim 2, wherein the connectivity device selecting at least one optimal computer network connection comprises:

selecting the at least one optimal computer network connection based upon a level of data security requested by a user of the computing device.

11. The method of connecting a computing device to a computer network of claim 2, wherein the connectivity device selecting at least one optimal computer network connection comprises:

selecting the at least one optimal computer network connection based upon a request of a user of the computing device.

12. The method of connecting a computing device to a computer network of claim 1, further comprising encrypting data that is transferred between the computing device and the computer network through the connectivity device.

13. The method of connecting a computing device to a computer network of claim 1, further comprising extending possible computer network connections by modularly connecting an additional connectivity unit to the connectivity device.

14. The method of connecting a computing device to a computer network of claim 1, further comprising:

receiving client credentials associated with the computing device; and

establishing the access with the selected service provider based upon the client credentials.

15. The method of connecting a computing device to a computer network of claim 14, wherein the client credentials are managed by a connectivity device.

16. The method of connecting a computing device to a computer network of claim 2, wherein monitoring a plurality of computing devices comprises recognizing when a present computer network link becomes unavailable and allowing a selection of a new computer network link.

17. The method of connecting a computing device to a computer network of claim 1, further comprising monitoring available network service providers and selecting a new network service provider when a present network service provider becomes unavailable.

18. The method of connecting a computing device to a computer network of claim 1, further providing a technique by which data packets provided by the computing device are presented to the computer network for routing.

19. The method of connecting a computing device to a computer network of claim 18, wherein the technique is one of a NAT personality, a proxy mode personality or a tunnel mode personality.

20. A method of connecting a computing device to a computer network through at least one of a plurality of computer network connections, the method comprising:

determining a location of the computing device;

determining what network service providers are available to the computing device based upon the location of the computing device;

selecting one of the available network service providers based upon information of the computing device;

providing access to the selected network service provider.

monitoring a plurality of computer network connections;

selecting at least one optimal computer network connection based upon the location of the computing device; and

providing a network interconnection between the computing device and the computer network through the at least one optimal computer network connection.

21. A connectivity device for providing a connection between a computing device and a computer network through at least one of a plurality of computer network connections, the connectivity device comprising:

a location module for determining a location of the connectivity device;

a link module for providing a link between the computing device and the computer network based upon the location and information received from the computing device; and

a service module for providing access to a service provider based upon the link and information received from the computing device.

22. The connectivity device of claim 21, further comprising a director module that directs interactions between the location module, the link module, the service module and the computing device.

23. The connectivity device of claim 21, further comprising:

a policy module for managing links maintained by the link module.

24. An article of manufacture adapted to provide a connection between a computing device and a computer network through at least one of a plurality of computer network connections, the article of manufacture adapted for use with a machine, comprising:

machine readable media; and

instructions stored on the machine readable media that when executed control the machine to:

determine which of a plurality of network service providers are available to the computing device;

select one of the available network service providers based upon information of the computing device; and

provide access to the selected network service provider.

25. The article of manufacture of claim 24, wherein the instructions stored on the machine readable media that when executed further control the machine to:

determine a location of the computing device; and

determine what network service providers are available to the computing device based upon the location of the computing device.

26. The article of manufacture of claim 24, wherein the instructions stored on the machine readable media that when executed further control the machine to:

monitor a plurality of computer network connections;

select at least one optimal computer network connection; and

providing a network interconnection between the computing device and the computer network through the at least one optimal computer network connection.

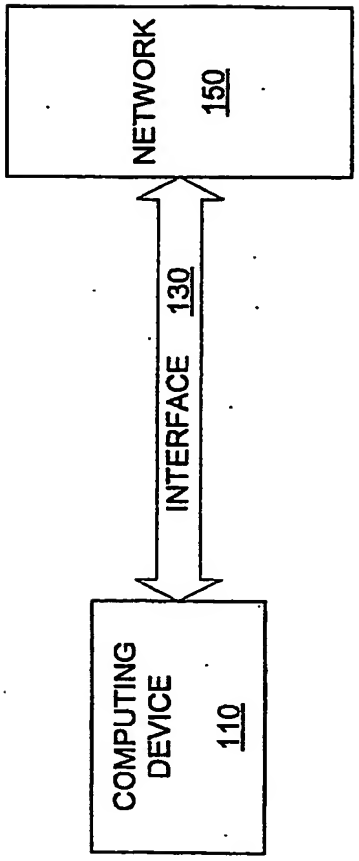

FIGURE 1 (PRIOR ART)

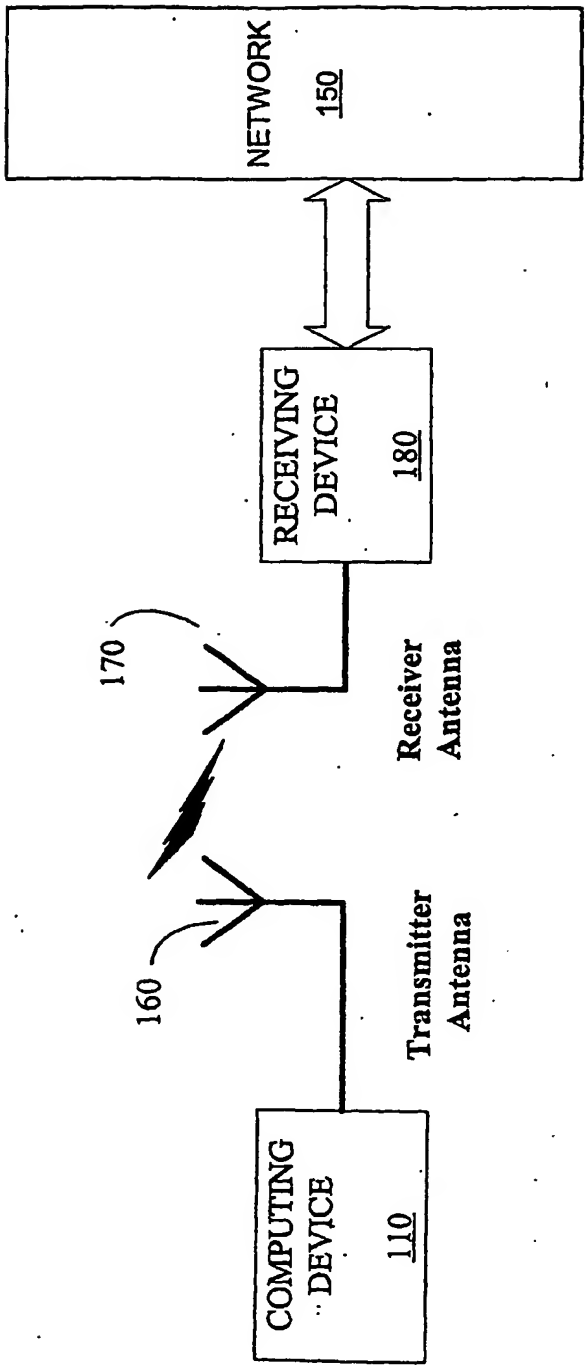

FIGURE 2 (PRIOR ART)

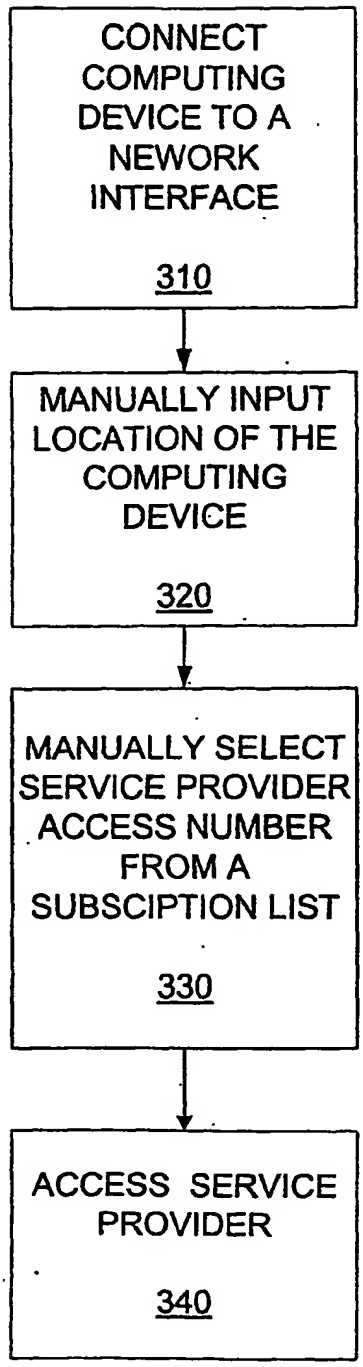

FIGURE 3 (PRIOR ART)

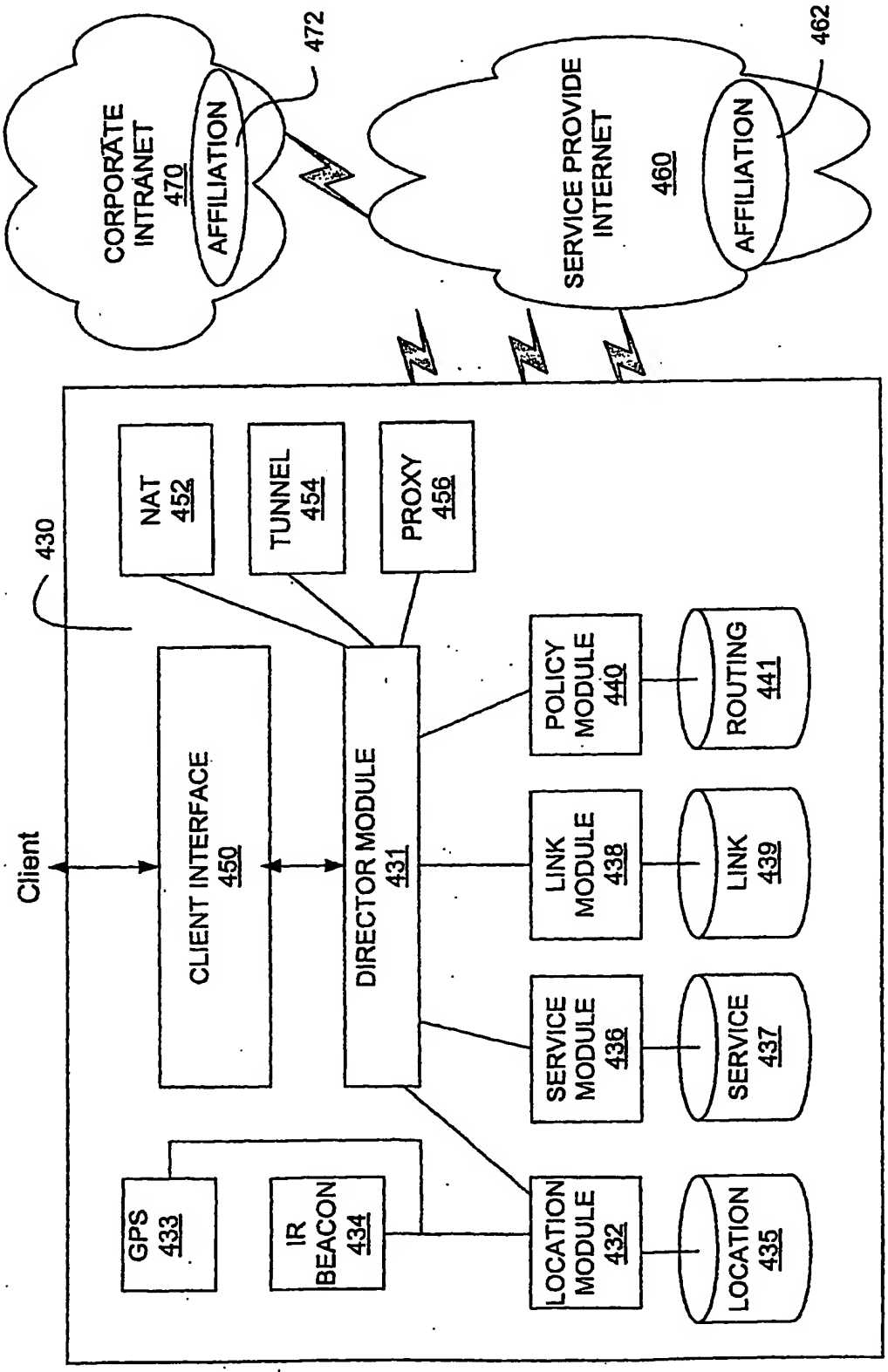
CORPORATE INTRANET 470
AFFILIATION
472
SERVICE PROVIDE INTERNET 460
AFFILIATION
462
430
NAT 452
TUNNEL 454
PROXY 456
Client
CLIENT INTERFACE 450
DIRECTOR MODULE 431
POLICY MODULE 440
ROUTING 441
LINK MODULE 438
LINK 439
SERVICE MODULE 436
SERVICE 437
GPS 433
IR BEACON 434
LOCATION MODULE 432
LOCATION 435

FIGURE 4

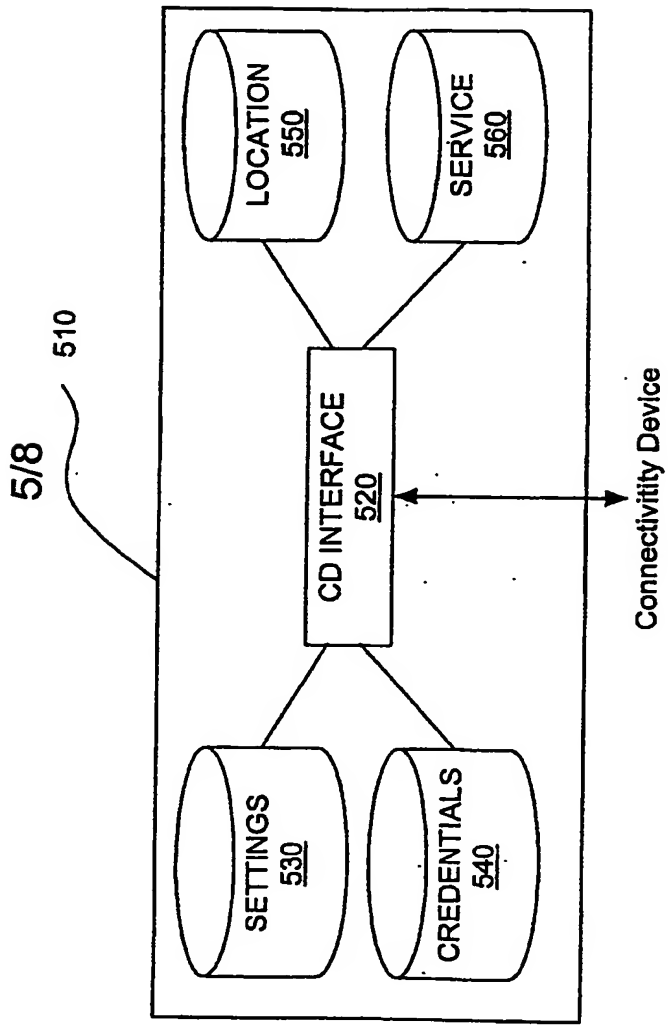
5/8
510
LOCATION
550
SERVICE
560
CD INTERFACE
520
Connectivitity Device
SETTINGS
530
CREDENTIALS
540

FIGURE 5

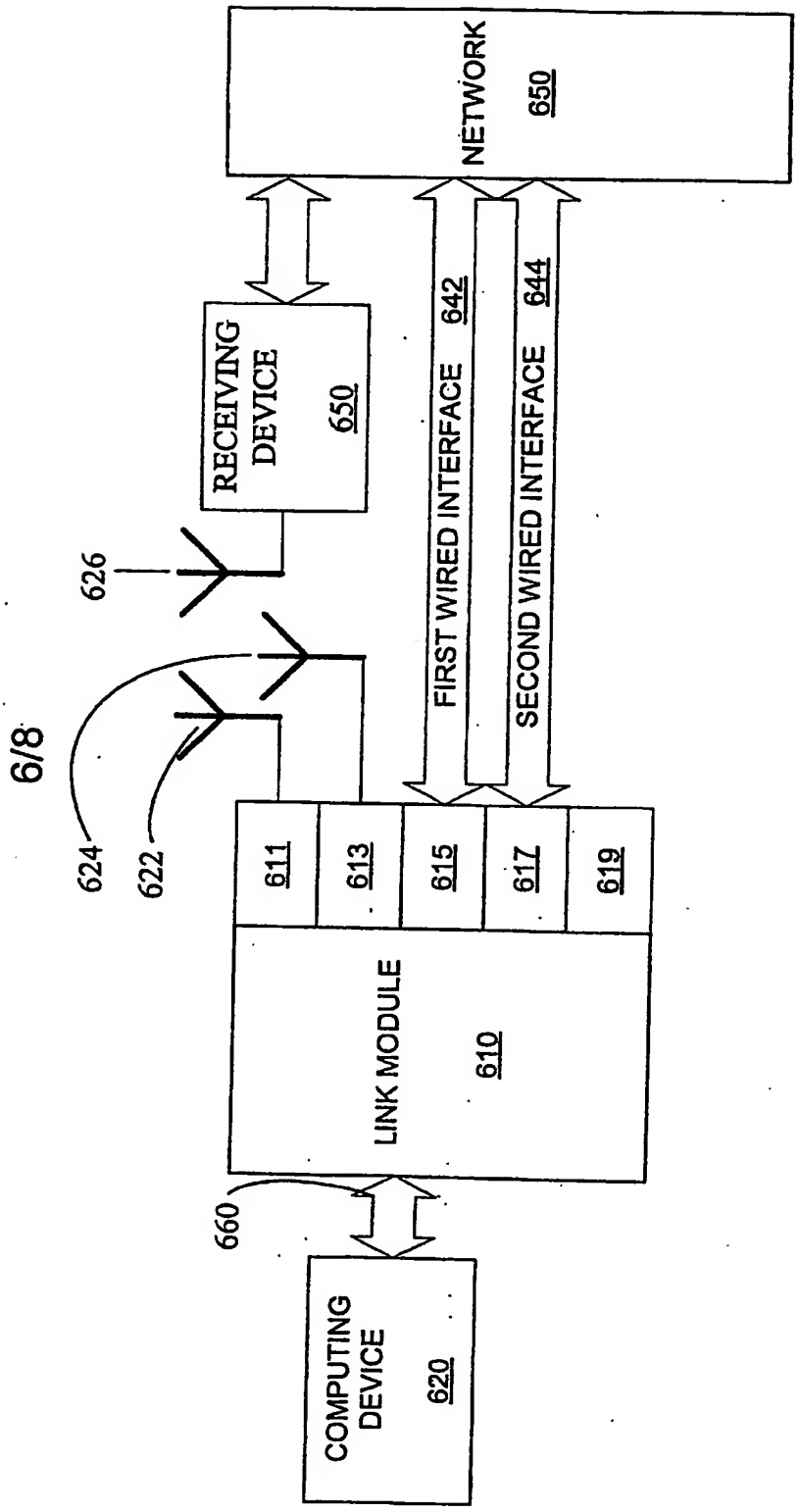
NETWORK
650
RECEIVING DEVICE
650
FIRST WIRED INTERFACE
642
SECOND WIRED INTERFACE
644
626
624
622
611
613
615
617
619
LINK MODULE
610
660
COMPUTING DEVICE
620

FIGURE 6

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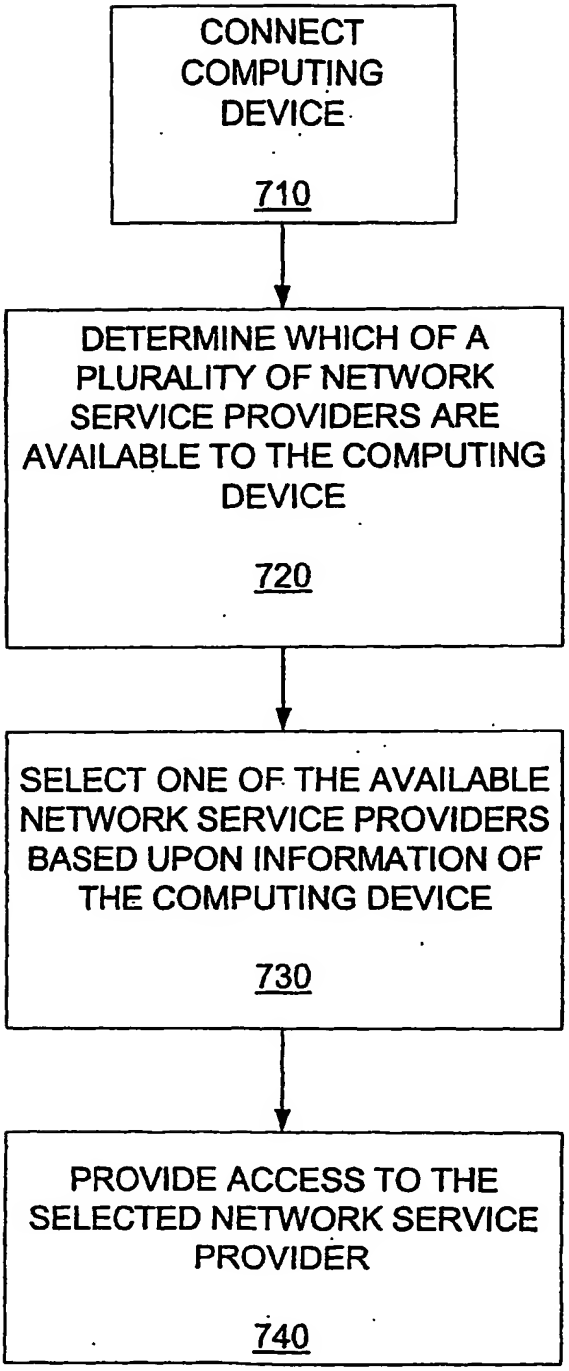
CONNECT COMPUTING DEVICE
710
DETERMINE WHICH OF A PLURALITY OF NETWORK SERVICE PROVIDERS ARE AVAILABLE TO THE COMPUTING DEVICE
720
SELECT ONE OF THE AVAILABLE NETWORK SERVICE PROVIDERS BASED UPON INFORMATION OF THE COMPUTING DEVICE
730
PROVIDE ACCESS TO THE SELECTED NETWORK SERVICE PROVIDER
740

FIGURE 7

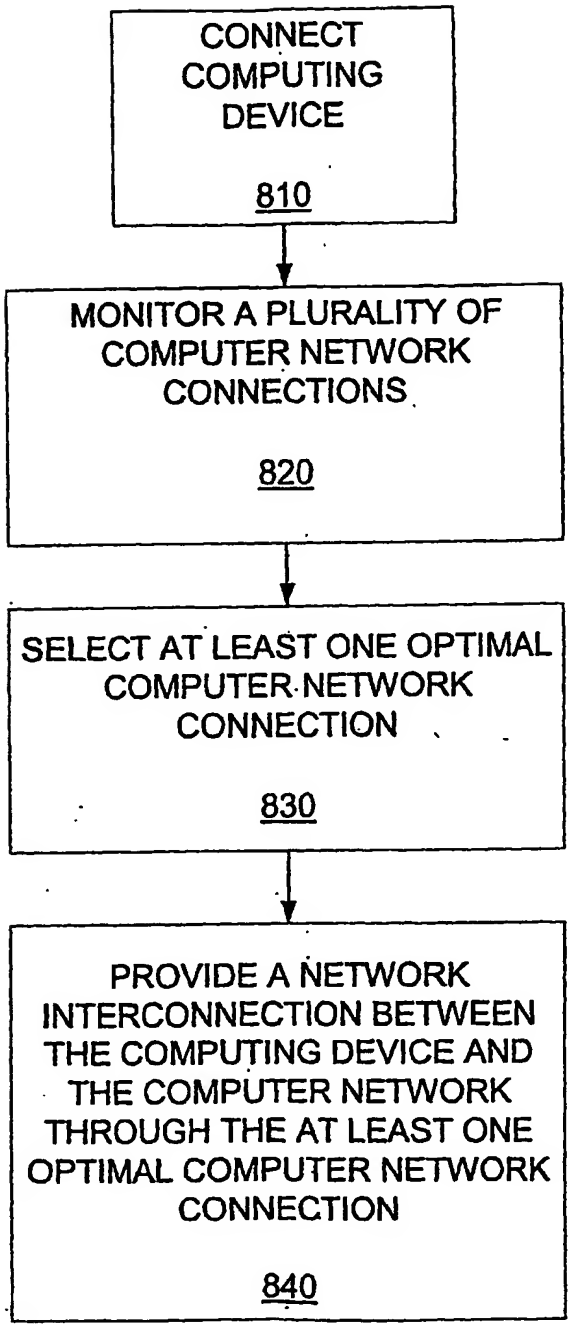
CONNECT COMPUTING DEVICE
810
MONITOR A PLURALITY OF COMPUTER NETWORK CONNECTIONS
820
SELECT AT LEAST ONE OPTIMAL COMPUTER NETWORK CONNECTION
830
PROVIDE A NETWORK INTERCONNECTION BETWEEN THE COMPUTING DEVICE AND THE COMPUTER NETWORK THROUGH THE AT LEAST ONE OPTIMAL COMPUTER NETWORK CONNECTION
840

FIGURE 8